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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY

FOREST INSECT INVESTIGATIONS

PRELIMINARY INSECT SURVEY

OF THE LASSEN VOLCANIC NATIONAL PARK

JUNE 21-24, 1930

by

E. A. SALLAN
Bureau of Entomology

Stanford University, California
July 28, 1930

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Introduction. The Lassen Volcanic National Park has been created to preserve the natural scenic, floral, faunal, recreational and educational features of the area included within its boundaries. Normal insect injury over the entire park area is a part of the natural order of things, and as such is not in any sense detrimental to the utilization of the park for the purposes for which it was created. Abnormal insect injury within the park limits, however, even though the infestation may not be severe enough to be considered epidemic, may so mar the landscape as to prevent the visitor from receiving the benefits he should from the natural features. In areas having a higher state of development or utilization, such as camp grounds, park headquarters, or areas surrounding other centers, the trees take on an added value because of the setting they provide. In such areas any insect loss is important and detrimental to the use for which the area is preserved; for in such cases reproduction does not flourish and natural replacement of old by young growth does not take place. Thus control of all insects damaging the trees, irrespective of the severity of the attack, is warranted in areas of intensive use.

Purpose of Survey. The purpose of the preliminary survey that has just been completed is to help in the initiation of a system of inspection and insect control; to obtain information concerning present general insect conditions; and to evaluate the importance of any unusual conditions involving insect attack. Unusual or epidemic insect attacks, if not discovered early in their history, are liable to do irreparable damage to the forest. Annual surveys of the park area, becoming more intensive as development of park facilities proceeds, are a necessary feature if the stands of trees within the park are to be kept intact and healthy. These surveys should detect incipient outbreaks, provide information upon which can be based control work, and locate susceptible areas in which it would be necessary to follow closely entomological developments.

Methods. All the developed roads within the park were cruised by automobile, examinations being made where conditions warranted. The course of the roads and the topography of the country permitted views of the greater part of the forested areas. In addition, intensive examinations were made of present camp sites and of those indicated by park authorities as being probable future developments. The Badger Flat lodgepole unit and the Cinder Cone burn were examined to ascertain the course of infestation in those two areas.

Insect Conditions. The following conditions were found to be present in various portions of the park, as specified below:

Park Headquarters--The eighty acres of land at Mineral has a forest cover that is chiefly Jeffrey pine and fir. The insect-killed trees found were three 1928-killed and five 1929-killed Jeffrey pine. The present brood (1929) was in the adult stage and emerging. The area is surrounded by forest land not included in the park that has an equal or somewhat heavier infestation. Although the headquarters area would be subject to infiltration and attack by insects originating outside the limits of the eighty acres, in view of the fact that the trees are of great value as a part of the setting and as shade, I should recommend that strict surveillance be maintained on this area and that all insect-killed trees found on it be treated in the late fall or early spring.

Juniper Lake Road--The area surrounding Juniper Lake and the road leading to it show but little insect damage. The present camp grounds are privately owned, and at the present time the park camp is but little developed. The forest cover is largely lodgepole pine, western white pine and fir. Yellow and Jeffrey pine is abundant at the lower altitudes. No abnormal insect conditions were found, a few fir killed by S. ventralis and lodgepole killed by D. monticola being the only work noticed. As the area, according to information received, is not to be a center of development, no control operations are recommended at the present time.

Garner Valley--At the present time this area is largely privately owned, but is expected to be a part of the park development. It has many excellent camp sites, and if developed should be protected. The tree species are Jeffrey pine along the sides of the valley and on the flat, fir mixed with the other species, lodgepole pine in the moister portions of the valley and a few incense cedar. Fifteen 1929-killed Jeffrey pine were counted along the five miles of road--an endemic infestation. Fir appeared moderately infested. The mountain pine beetle was vigorously attacking the lodgepole pine, although the epidemic has not yet assumed epidemic proportions. No estimate was made of the number of trees that would have to be treated; for unless the private owners could be interested, or all the land brought under the park management, there would be little gained by treating a portion of the valley. If the park takes over this area a re-cruise should be made and the insect-killed trees in the valley treated.

Sulphur Works Road--This road when completed will be the main road through the park; but the terrain offers little opportunity for the development of camp sites. The forest cover is largely fir, and beyond Diamond Peak it becomes scattered and sparse. It has only a slight infestation of S. ventralis, except where road construction seems to have been the cause of some concentration. No control work appears necessary in this area at the present time.

Museum Camp Site--The land covered by the present camp site is partly owned by the Pacific Gas and Electric Company. The timber is almost entirely Jeffrey pine. It is slow-growing and in poor condition, as the site is unfavorable. A few small fir line Manzanita Creek, and of these three have been killed by insects during the past season. In the Jeffrey pine stand two trees were killed in 1928 and seven in 1929. Since the trees are valuable as cover for the camp ground, it is recommended that, if arrangements can be made to include the privately-owned land in the operation, the stand be examined periodically and the infested trees treated.

Upper King's Creek Meadows--Insect losses in this camp ground are slight. But one lodgepole pine was killed by the 1929 brood; and but three firs were killed this past season. On the slopes of White Mountain, above the area, the losses are approximately the same; but around the shoulder of the mountain to the east of the meadow losses were much greater. In that area the number of dead snags indicated a heavier infestation in the past than exists at the present time. The present fir infestation extends down into the King's Creek Valley. If the meadows are utilized as a camp ground, control measures should be undertaken in and around the area utilized. If the general infestation mentioned above does not become heavier control measures will not be necessary.

Summit Lake and Dersch Meadows Area--This area, through which the park highway extends, comprises the site intended by the authorities to be the chief camp ground in that portion of the park. In the meadows, along the East Fork of Hat Creek and around Summit Lake lodgepole pine is the most abundant tree species, while on the slopes on each side fir and some western white pine occur. Road construction has undoubtedly increased the number of dead lodgepole so that at the present time a rather large number of dead and dying insect-infested trees line the road. Around Summit Lake eight lodgepole were killed during the 1929 season. On the north side of the lake trees killed during past seasons were abundant, and so far as could be ascertained there has been a steady, though not heavy, early loss. Along the road from Summit Lake to the lower end of Dersch Meadows, 43 trees were counted in approximately two miles. These in large measure denote a concentration of the infestation due to road-building activities, for the lodgepole farther from the road showed much less insect loss. Fir in the vicinity of the camp ground areas showed a steady though endemic loss from the fir engraver beetle, and numerous branches were dead or dying. Examination of several of the younger trees with single dead or dying branches showed that at least part of this injury was due to attacks of the engraver beetle just below the limbs; but observations in other portions of the park indicate that some of the injury may be due to mistletoe. If this area is used as a camp ground annual control measures will be necessary and strict surveillance should be maintained. If it is not so used, no control will be necessary for the present.

Badger Flat and Lower Hat Creek Area--This unit has a stand of lodgepole and Jeffrey pine with some fir intermixed. The Jeffrey pine shows an endemic infestation, as does the fir. There are numerous dead lodgepole--trees evidently dead for two years or more--and reproduction is coming in heavily. The present infestation is scattered in groups of from three to approximately 12 trees. The area is isolated and apparently little used, but the lodgepole stand extends up the valley to the Dersch Meadows area. Because of its isolation from the intensively-used areas, control work at the present time is apparently unnecessary, although there will be a steady and rather heavy loss if the present infestation continues. Any control work would be hampered by the fact that part of the area is on national forest land, and that the forest type extends down into rather heavily infested stands in the National Forest some distance outside the park limits. Careful examinations of the valley should be made periodically, and if the infestation becomes epidemic and begins to spread up the valley control operations should be initiated.

Cinder Cone Burn--Approximately 1000 acres of Jeffrey pine-fir type stand were burned in 1928. The remaining trees are still dying from the combined effects of fire and insects. Pines that survived the fire are apparently not infested by insects to any great degree, but weakened firs within the area continue to be subject to attacks by the fir engraver beetle. Roundheaded borer larvae are abundant in the dead and dying trees, but apparently little can be done to clean up the area. There appears to have been no spread of insect activity outside the burned area, and the unscorched trees exhibit no symptoms of infestation. Although the present situation is unsightly, it is felt that control operations are unjustified, because of the fact that only injured trees are succumbing and because insect attack is limited to the burned area. Careful watch of this area should be maintained and measures taken if insect depredations show a tendency to spread to the healthy trees surrounding the burn.

Butte Lake Area--The stand of Jeffrey and yellow pine in the vicinity of the Butte Lake Ranger Station is exceptionally free of insect injury. No control measures are necessary.

Control work covering the infestation in the entire park would be a very expensive undertaking. At the same time it is doubtful whether the loss of certain trees under endemic conditions is of sufficient importance to warrant the cost of controlling this type of infestation on all areas within the park. In the present stage of Lassen National Park's development, control of insect infestations can be considered under the following conditions:

1. Where the entire forest cover of an area is threatened by an epidemic infestation, such as that of the mountain pine beetle in lodgepole pine which developed in Crater Lake National Park;
2. In intensively-used areas, such as camp grounds and administrative quarters, where the loss of even a few trees each year from endemic infestations is detrimental to the use of the park.

The recent survey of the park indicates that under the present status of insect infestations no serious epidemics are involved, and that control work need be considered only where intensively used areas now exist or are contemplated. The headquarters tract at Mineral and the Museum camp ground are suggested as areas which warrant intensive protection, and control work is therefore recommended there. The inclusion of other areas in an intensive control program should depend largely upon the value set by the Park Service upon the present forest cover in plans for the development of the park. It may be desirable to include the Warner Valley and the Summit Lake-Hersch Meadows areas, where lodgepole pine is threatened. Any indication of an increase of infestation in such areas should be promptly taken in hand to prevent the development of an epidemic.

Recommendations for Control.

It is too late to carry on control work this season, as the Jeffrey pine beetles are emerging at the present time, and indications at the time the survey was made were that the mountain pine beetle would emerge in the near future. The allotment for the fiscal year, however, would cover the expense of work done in the fall of this season or in the spring of 1931. Spring control work would probably be more satisfactory, as the trees would show the effects of attack to a much greater degree than they would in the fall.

Past experience in other areas has shown the cost of treating Jeffrey and yellow pine to be about \$4.00 per tree and lodgepole pine about \$2.00 per tree. This cost can be somewhat lowered for Jeffrey and yellow pine by utilizing the wood as fuel. The bark and infested portions of the trees must be burned, however, unless it is found possible to utilize the solar-heat method of control. The bark of lodgepole pine is difficult to remove, so that burning must be resorted to in controlling the mountain pine beetle attacking that tree species.

Another survey should be made early in the spring of 1931, and infested trees on the areas in which control is necessary should be marked. The marked trees should be felled and treated immediately following the completion of the survey.

The actual cost of control work that should be done in 1931 will depend on the species and number of trees involved. Judging from the conditions existing at the time of the 1930 survey, the areas probably requiring attention, the number of trees and cost of treating may be estimated as follows:

Headquarters, Mineral - 8 Jeffrey pine at \$4.00 each	- - - -	\$32.00
Museum camp ground - 12 "	" 4.00 - - - -	48.00
	Total estimated cost- - -	\$80.00

If insect conditions in other developments within the park warrant their inclusion in a control program the above estimate will prove insufficient. The advisability of including other areas in the control operations can be determined by the 1931 survey.